

We claim:

1. Apparatus comprising:

a circuit board;

5 a plurality of pluggable modules coupled to the circuit board, the plurality of pluggable modules insertable through side-by-side slots in an enclosure in which the circuit board resides;

a first of the pluggable modules being coupled to the circuit board via a first connector;

10 a second of the pluggable modules being coupled to the circuit board via a second connector such that the pluggable module is laterally offset from the first pluggable module.

2. The apparatus of claim 1 wherein the first and second connectors are right angle

15 connectors, and wherein the second right angle connector is inverted relative to the first right angle connector.

3. The apparatus of claim 1 further comprising a riser board coupled to the circuit

board, and wherein the riser board comprises two rows of connectors, and wherein the

20 first pluggable module is coupled to the circuit board via a first connector in the first of the two rows of connectors, and wherein the second pluggable module is coupled to the circuit board via a second connector in the second of the two rows of connectors.

4. The apparatus of claim 2 wherein the first and second pluggable modules are I/O modules for transporting high speed differential signals, and wherein the first pluggable module includes a first number of I/O connectors of a first size, and wherein the second pluggable module includes a second number of I/O connectors of a second size, and wherein the first number is less than the second number, and wherein the first size is larger than the second size.
5. The apparatus of claim 4 wherein the second number of I/O connectors are a second number of SFP connectors arranged on both sides of the second pluggable module.
6. The apparatus of claim 4 wherein the first number of I/O connectors are a first number of XFP connectors arranged on one side of the first pluggable module.
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7. Apparatus comprising:
 - a first pluggable module for coupling to a circuit board via a first connector, the circuit board residing in an enclosure having side-by-side slots thereon for inserting pluggable modules therethrough for coupling to the circuit board, such that when the first pluggable module is coupled to the circuit board through one of the side-by-side slots, it resides side-by-side but laterally offset from a second pluggable module coupled to the circuit board through another of the side-by-side slots.

8. The apparatus of claim 7 wherein the second pluggable module is coupled to the circuit board via a second connector, and wherein the first and second connectors are right angle connectors, and wherein the second right angle connector is inverted relative to the first right angle connector.
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9. The apparatus of claim 7 further comprising a riser board coupled to the circuit board, and wherein the riser board comprises two rows of connectors, and wherein the first pluggable module is for coupling to the circuit board via a first connector in the first 10 of the two rows of connectors, and wherein the second pluggable module is coupled to the circuit board via a second connector in the second of the two rows of connectors.
10. The apparatus of claim 8 wherein the first and second pluggable modules are I/O modules for transporting high speed differential signals, and wherein the first pluggable 15 module includes a first number of I/O connectors of a first size, and wherein the second pluggable module includes a second number of I/O connectors of a second size, and wherein the first number is less than the second number, and wherein the first size is larger than the second size.
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11. The apparatus of claim 10 wherein the second number of I/O connectors are a second number of SFP connectors arranged on both sides of the second pluggable module.

12. The apparatus of claim 10 wherein the first number of I/O connectors are a first number of XFP connectors arranged on one side of the first pluggable module.

5 13. A storage system enclosure comprising:

a first pluggable module including a host interface having several XFP connectors mounted on one side thereof;

a second pluggable module including an I/O interface having several SFP connectors mounted on both sides thereof;

10 a circuit board for transferring data between the host interface and the I/O interface;

the first pluggable module being coupled to circuit board via a right angle connector such that the first pluggable module is in-line with the circuit board;

15 the second pluggable module being coupled to the circuit board via a similar but inverted right angle connector such that the second pluggable module is laterally offset from the circuit board.

14. The storage system enclosure of claim 13 wherein the first and second right-angle connector pin-outs are the same.

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15. The storage system enclosure of claim 14 wherein the first and second right angle connectors transport lanes of differential signals, and wherein the first and second right

angle connectors are coupled to LVDS chip-to-chip protocol controllers, and wherein each LVDS chip-to-chip protocol controller performs lane reversal and/or polarity inversion based on whether or not the right angle connector to which it is connected is inverted.

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16. The storage system of claim 15 wherein the LVDS chip-to-chip protocol controllers are PCI Express controllers.

17. The storage system of claim 14 wherein the first and second right angle connectors transport low speed signals, and wherein a low speed signal controller on the circuit board decodes the control signals based on whether or not the right angle connector to which the low speed signal controller is coupled is inverted.

18. The storage system of claim 17 wherein the first and second right angle connectors transport serial bus signals, and wherein a serial bus controller on the circuit board decodes the serial bus signals into clock and data signals based on whether or not the right angle connector to which the serial bus controller is coupled is inverted.

19. A method comprising the steps of:
20 coupling a first pluggable module to a circuit board via a first connector, the circuit board residing in an enclosure having side-by-side slots thereon for inserting pluggable modules therethrough for coupling to the circuit board, such that when the first

pluggable module is coupled to the circuit board through one of the side-by-side slots, it resides side-by-side but laterally offset from a second pluggable module coupled to the circuit board through another of the side-by-side slots.

5 20. The method of claim 19 wherein the second pluggable module is coupled the circuit board via a second connector, and wherein the first and second connectors are right angle connectors, and wherein the step of coupling the first pluggable module to the circuit board includes the step of coupling the first pluggable module to the circuit board via a first right angle connector such that the first right angle connector is inverted
10 relative to the second right angle connector.

21. The method of claim 20 wherein the first and second pluggable modules are I/O modules for transporting high speed differential signals, and wherein the first pluggable module includes a first number of connectors of a first size, and wherein the second pluggable module includes a second number of connectors of a second size, and wherein the first number is less than the second number, and wherein the first size is larger than
15 the second size.

22. The method of claim 21 wherein the second number of connectors are SFP
20 connectors arranged on both sides of the second pluggable module.

23. The method of claim 21 wherein the first number of connectors are XFP
connectors arranged on one side of the first pluggable module.

24. Apparatus comprising:

5 An enclosure having a slot thereon for accepting a pluggable module, wherein the
pluggable module can be inserted in a plurality of positions in the slot.

25. The apparatus of claim 24 wherein the pluggable module is coupled to a circuit
board via a connector when inserted in the slot, and wherein the pluggable module may
10 be laterally in-line with or laterally offset from the circuit board depending upon the
position of the connector on the pluggable module.

26. The apparatus of claim 25 wherein the pluggable modules is an I/O module, and
wherein the pluggable module includes either a first number of I/O connectors of a first
15 size, or a second number of I/O connectors of a second size, and wherein the first number
is less than the second number, and wherein the first size is larger than the second size,
and wherein the connector is positioned in a first position if the pluggable module
includes the first number of I/O connectors so that the pluggable module is in line with
the circuit board, and wherein the connector is positioned in a second position of the
20 pluggable module includes the second number of connectors so that the pluggable
module is offset from the circuit board.